THE OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING FOR RESEARCH AND TECHNOLOGY

NEWSLETTER

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INNOVATING TODAY TO PROTECT OUR FUTURE

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FEATURED

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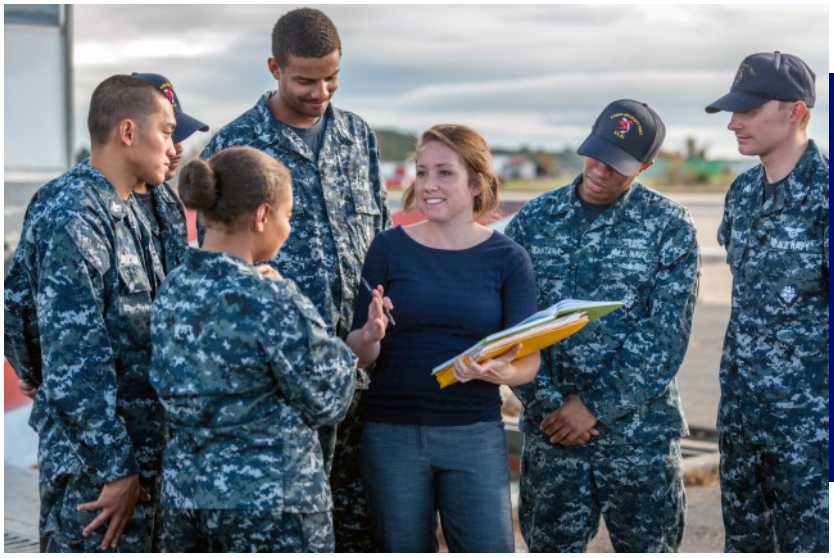
DoD STEM Advocate of the Quarter Award Winner Presented at the DoD Innovators Spotlight Series

FEATURED UPDATES

DoD Awards $47 Million in Grants Through the National Defense Education Program (NDEP)



Systems engineers at the Naval Air Station Patuxent River in Maryland conduct flight test engineering and ship suitability research to ensure that aircraft can launch and land safely aboard aircraft carriers.
(Courtesy of DoDSTEM site)

Department of Defense
DoDSTEM
Science · Technology · Engineering · Mathematics

The DoD, through the Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)), awarded more than $47 million to 15 awardees under the NDEP in Science, Technology, Engineering, and Mathematics (STEM), Biotechnology, and Enhanced Civics Education. STEM and Biotechnology activities will support the DoD STEM Strategic Plan, Fiscal Year 2021–2025, and align to the 2018 Federal STEM Strategic Plan. Several of these efforts will include participation with the Department's laboratories and military installations from across the country. In addition, section 234 of the Fiscal Year 2020 National Defense Authorization Act required OUSD(R&E) to implement a pilot program on enhanced civics education in collaboration with the Department of Defense Education Activity and/or Junior Reserve Officer Training Corps. Enhanced Civics Education awardees will receive $4 million over two years to prepare the next generation to better understand the U.S. Government and their role as citizens in civic engagement. To learn more about these awards, visit https://www.cto.mil/news/47-million-grants-ndep/. For information about DoD STEM, visit https://dodstem.us/.

DoD Awards Science, Mathematics, and Research for Transformation (SMART) Scholar SEED Grant Program Recipients for Fiscal Year (FY) 2022

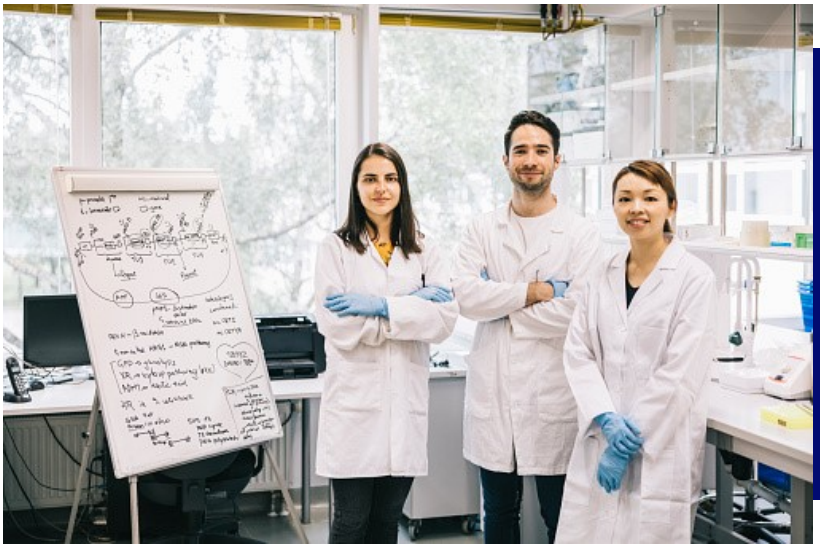
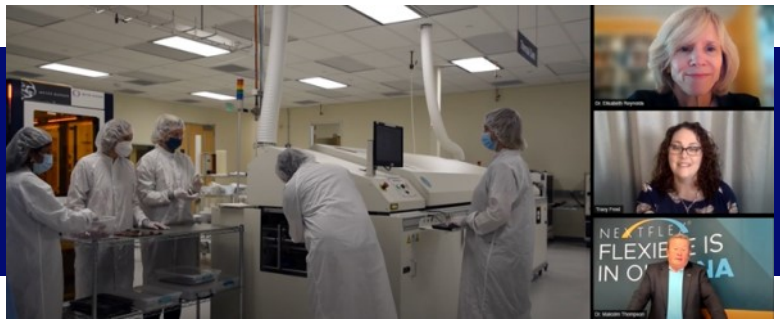


Image Sourced from Getty Images

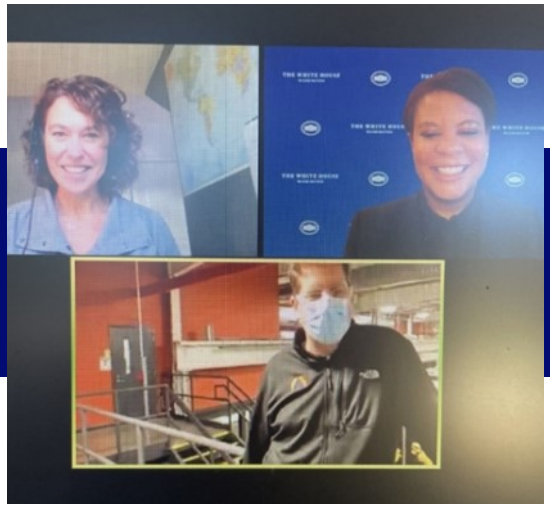
SMART
SCIENCE, MATHEMATICS, AND RESEARCH FOR TRANSFORMATION
PART OF THE NATIONAL DEFENSE EDUCATION PROGRAM

The DoD, through the Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)), awarded grants to 21 SMART Doctor of Philosophy (Ph.D.) scholars, as part of its FY 2022 SMART Scholar SEED Grant Program. The Program competitively awards research grants up to $100,000 per year for up to a maximum of three years to help support promising SMART scholars establish a foundational research/engineering effort in their area of expertise as they transition from the pursuit of their Ph.D. to becoming an active DoD professional. The aim is to develop a cadre of future talent to initiate high-impact research at SMART sponsoring facilities while creating DoD subject matter experts. It is an opportunity for scholars who have pursued a Ph.D. through the SMART Program to deepen their expertise in targeted STEM areas that are strategically important to the Department, and allows them to lead their own research effort while receiving valuable mentoring within their current facility. The FY 2022 'garden' of SEED grant awardees, from across the Army, Navy, Air Force, and other DoD agencies, joined 20 investigators awarded in FY 2021, in the inaugural year of the SEED Grant effort. For information about the SMART Scholarship-for-Service Program, visit https://www.smartscholarship.org/smart.

White House S&T Advisors Join DoD MII Manufacturing Day Events



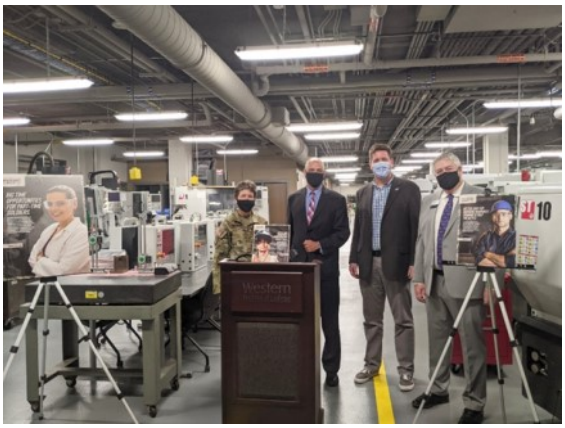
NextFlex engineers in the lab, guests Dr. Elisabeth Reynolds (top right), Tracy Frost (center right), and NextFlex CEO Dr. Malcolm Thompson (bottom right).
(Courtesy of NextFlex)



Joe Steele of LIFT (bottom) meets with senior White House advisors as part of National Manufacturing Day
(Courtesy of LIFT)

Two Department of Defense-sponsored Manufacturing Innovation Institutes (MIIs), LIFT and NextFlex, were honored to have senior White House advisors join their virtual celebrations of National Manufacturing Day on October 1, 2021. Speaking to the participating students, the special guests highlighted many exciting science, technology, and manufacturing jobs and opportunities available in the United States for those with the right skills. Dr. Alondra Nelson, Deputy Director for Science and Society, White House Office of Science and Technology Policy, joined for a livestream tour of LIFT's sophisticated facility in Detroit, Michigan. Dr. Nelson encouraged participants to "learn now to be builders and makers" to help the country meet its demand for bright, innovative, thoughtful people, adding, "We're here to help you do that." NextFlex's event featured Dr. Elisabeth Reynolds, Special Advisor to the President for Manufacturing and Economic Development, who provided an overview of the administration's priorities for rebuilding American manufacturing so that our country is "inventing it here, and making it here." The students then heard from Ms. Tracy Frost, Manufacturing Technology Program Director, about her own interesting personal journey to becoming an engineer.

LIFT Expands Operation Next to Wisconsin National Guard and Reserve



Core Partners Group at Western Technical College; La Crosse, WI (Courtesy of LIFT)

LIFT, the Detroit-based, Department of Defense-sponsored national Manufacturing Innovation Institute (MII) that is part of the Manufacturing USA network, recently announced that its "Operation Next" advanced manufacturing certification program is available for Wisconsin National Guard and Reserve members and their spouses. LIFT is partnering with Western Technical College in La Crosse, Wisconsin and Lab Midwest in Mequon, Wisconsin, to offer this program expansion. Operation Next is an innovative, self-paced, advanced manufacturing-focused training and credentialing initiative that blends hands-on and virtual learning. The credentialing program is also active in Michigan and Florida, following the completion of a successful initial pilot for separating military personnel at Fort Campbell, Kentucky. Operation Next is expanding to nine additional military installations with funding provided by the DoD Manufacturing Engineering Education Program. Western Technical College will recruit members of the Wisconsin Guard and Reserve and their spouses to enroll in the Operation Next program and guide students through their educational experience to attain nationally portable and industry-recognized credentials from either the National Institute of Metalworking Skills (NIMS) or the Smart Automation Certification Alliance (SACA). Learn more about Operation Next at www.opnextjobs.com.

The Technology and Manufacturing Industrial Base (TMIB) Directorate engaged extensively with Congress and the White House during Q4 FY21. In July, TMIB provided multiple briefings to Congressional Professional Staff Members on the success of various COVID-related projects from the DoD Manufacturing Innovation Institutes (MIIs). Other briefings covered the MIIs' extensive technical education and workforce development projects. TMIB also met with Ms. Elisabeth Reynolds, Special Assistant to the President for Manufacturing and Economic Development, to discuss the Biden Administration's manufacturing agenda and how TMIB can collaborate across the Federal Government on a cohesive manufacturing strategy. In September 2021, TMIB Director Mr. Rob Gold attended a listening session with several manufacturing-related startups hosted by the Executive Office of the President. The startups shared their challenges and opportunities in scaling up manufacturing for critical technology areas. Continuing TMIB's fourth quarter industry engagements, Mr. Gold spoke at the Defense Strategies Institute's Military Additive Manufacturing Summit in Tampa, Florida on DoD's investments in and support for additive manufacturing (AM). He discussed the Department's AM Strategy and Joint Additive Manufacturing Working Group, and how DoD aligns activities across the AM supply chain. Concurrently, Defense.gov interviewed OSD Manufacturing Technology Program Director Tracy Frost for an article on the Department's new additive manufacturing policy, Department of Defense Instruction 5000.93, "Use of Additive Manufacturing in DoD." TMIB looks forward to continuing and strengthening these various government and industry partnerships in Fiscal Year 2022.

DoD Science, Technology, Engineering, and Math (STEM) Advocate of the Quarter Award Winner Presented at the DoD Innovators Spotlight Series Webinar in October

The Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)) for Research and Technology hosts the monthly virtual DoD Innovators Spotlight Series featuring recognized scientists and engineers across the Defense Enterprise, with the purpose to share their cutting-edge work and best practices amongst the Defense Enterprise and with the general public. On 26 October, Dr. Oluseyi (Seyi) Ayorinde, awarded by OUSD(R&E) as STEM Advocate of the Quarter, shared his insight about his recognized STEM outreach work helping to inspire and cultivate the next generation of STEM leaders, especially students in underserved areas. Dr. Ayorinde is a researcher on the Silicon team at the U.S. Army Combat Capabilities Development Command (CCDC), which is part of the Army Research Laboratory (ARL), and is currently working out of the west coast office in Playa Vista. He received his PhD from the University of Virginia, where he explored generating and configuring custom, sub-threshold Field Programmable Gate Array hardware, as well as designing accelerators for ultra-low power systems-on-chip. He is currently focusing on development of low-power digital circuits for various applications. His research interests include Machine Learning Acceleration, Swarming Algorithm Acceleration, Digital Application-Specific Integrated Circuit (ASIC) design, and Low-Power FPGA hardware design. He also has an interest in STEM outreach, particularly in exposing underrepresented communities in STEM to engineering and science activities and opportunities. He serves as the chair of the CCDC ARL-West Outreach Committee.

To view Dr. Ayorinde's previously recorded presentation, and to learn more the DoD Innovators Spotlight Series, visit https://dodstem.us/meet/innovators/.

Dr. Oluseyi (Seyi) Ayorinde

STEM Advocate of the Quarter,

Researcher on the Silicon team at the U.S. Army Combat Capabilities Development Command (CCDC),

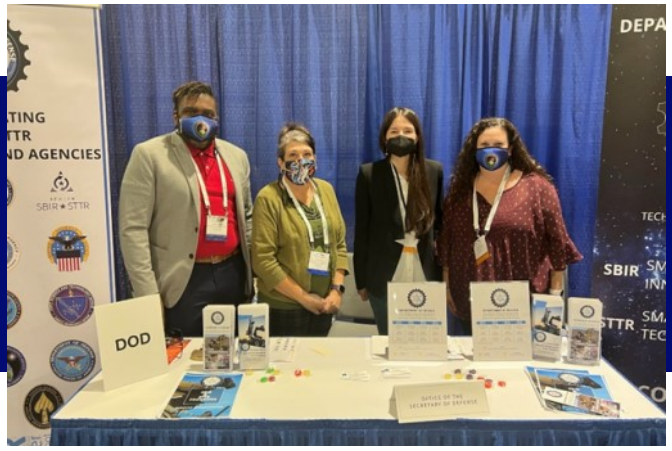
The Basic Research Office (BRO) Joins Small Business and Technology Partnerships (SBTP) in Pilot Program releasing Small Business Technology Transfer (STTR) topics

The Basic Research Office (BRO) collaborated with SBTP and released seven STTR topics for proposal submissions under Joint DoD 21.C. STTR Broad Agency Announcement (BAA). The BRO STTR program focuses on exploiting scientific discoveries from the DoD Basic Research Programs and providing a mechanism to further scientific development, maturation, and commercialization. Utilizing the STTR program, BRO facilitates the transition of basic research to applied research by collaborations between academic researchers and small businesses.

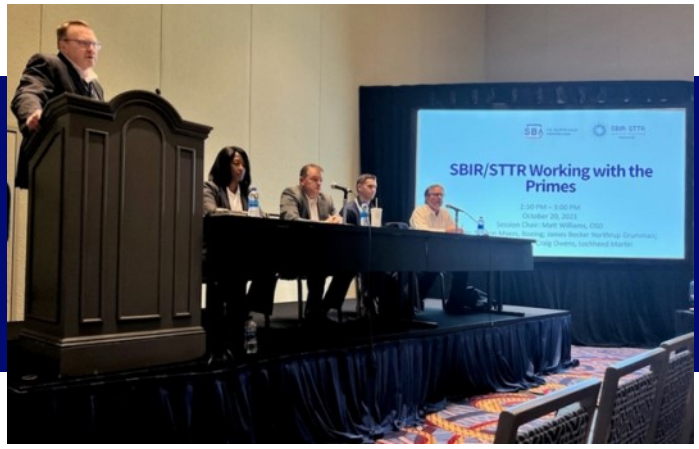
The topics for proposals submissions spanning the following Modernization Priorities: Quantum Sciences; Microelectronics; Control and Communications; General Warfighting Requirements (GWR), Hypersonics, Artificial Intelligence/Machine Learning are as follows:

- STTR Topic OSD21C-001: *"Solid State Non-Reciprocal Microwave Devices." Modernization Priorities: Quantum Science, Microelectronics, Network C3, General Warfighting Requirements (GWR).*
- STTR Topic OSD21C-002: *"Magnetic-free non-reciprocal and topological integrated microwave components." Modernization Priority: Microelectronics.*
- STTR Topic OSD21C-003: *"Modular Energetic Materials Synthesis Platform." Modernization Priorities: Hypersonics, General Warfighting Requirements (GWR).*
- STTR Topic OSD21C-004: *"Epsilon-near-zero tunneling diodes for room-temperature infrared detectors and light sources." Modernization Priorities: Microelectronics, General Warfighting Requirements (GWR).*
- STTR Topic OSD21C-005: *"Ultra-Sensitive Microwave, THz, and IR Sensors Based on Tunable Josephson Junctions, Realized in Graphene Moiré Superconductors." Modernization Priorities: Microelectronics, Quantum Science.*
- STTR Topic OSD21C-006: *"Public Observatory for Integrated Population Migration Data and Modeling." Modernization Priorities: Artificial Intelligence/Machine Learning, General Warfighting Requirements (GWR).*
- STTR Topic OSD21C-007: *"Biologically-informed Unmanned Underwater Vehicles (BIUUVs)." Modernization Priority: General Warfighting Requirements (GWR)*
- *For more information on the Joint DoD 21.C STTR BAA, please visit:* https://rt.cto.mil/wp-content/uploads/DoD_STTR_21C_FULL.pdf

DoD Small Business and Technology Partnerships at TechConnect World Innovation Conference and Expo 2021



Susan Celis, (second from the left), Acting Director, DoD Small Business and Technology Partnerships, SBIR/STTR Program Manager with colleagues at their booth in the TechConnect World Innovation Conference 2021 exhibitor Pavilion.



Matthew Williams, Technology Portfolio Manager & Director, Rapid Innovation Fund moderating panel with (from left) Dr. Sharon Myers, Boeing; Craig Owens, Lockheed Martin; Jim Baker, Northrop Grumman and Alf Carroll, Raytheon.

Small Business and Technology Partnerships (SBTP) Acting Director, Susan Celis, and Matthew Williams, SBTP's Technology Portfolio Manager & Acting Director, Rapid Innovation Fund participated in the TechConnect World Innovation Conference and Expo 2021, from October 18 – 20, at the Gaylord Convention Center, National Harbor, MD. For over 20 years, the TechConnect World Innovation Conference and Expo, one of the largest meetings in the SBIR/STTR community, has connected top applied research and early-stage innovations from universities, labs, and startups with industry end-users and prospectors.

At this year's event, Ms. Celis presented an overview of the agency's program during a panel, *"SBIR/STTR 101 & Agency Briefings,"* with representatives from Army, Navy, Air Force, DARPA, MDA, SOCOM, and other Federal agencies. Mr. Williams participated in the *"SBIR/STTR: Working with the Primes,"* panel along with representatives from Boeing, Northrop Grumman, Raytheon and Lockheed Martin.

The event featured the SBIR/STTR Pavilion, an open space that enabled agencies to set-up exhibits to disseminate program information and engage with small business, academia, and industry partners in a socially distanced and safe manner. The SBTP team met with conference attendees to answer questions and encourage them to participate in the DoD SBIR/STTR programs.

The 2021 TechConnect World Innovation event included the annual SBIR/STTR Innovation Conference, AI TechConnect, and the TechConnect Technical Program - more than 35 world-class technical symposia, and the Nanotech Conference Series – the world' s largest and longest running nanotechnology event.

VBFF Fellow Richard Baraniuk receives Harold W. McGraw, Jr. Prize in Education

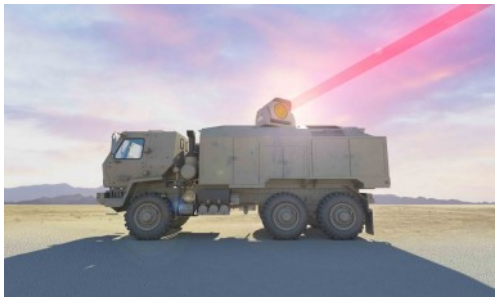
Vannevar Bush Faculty Fellow, Professor Richard G. Baraniuk, (class of 2017) the founding director of OpenStax (Rice University's educational technology initiative), has received the Harold W. McGraw, Jr. Prize in Education. This award, known informally as the "Nobel Prize of education," is given annually by the Harold W. McGraw, Jr. Family Foundation and the University of Pennsylvania Graduate School Of Education, and goes to "outstanding individuals whose accomplishments are making a difference in the lives of students." Professor Baraniuk is among the founders of the Open Education movement promoting the use of free and open-source-licensed Open Educational Resources. He is the director of OpenStax (formerly Connexions), a non-profit educational and scholarly publishing project he founded in 1999 to bring textbooks and other learning materials into the digital age. Developing education and workforce development strategies are vital aspects of the VBFF program. The contributions Professor Baraniuk has made in education, workforce development, and research during his fellowship has been invaluable and will inspire hundreds of education practitioners and entrepreneurs globally (and within DoD), who link to his work and create additional innovative tools.

Prof. Richard G. Baraniuk

Harold W. McGraw, Jr. Prize in Education

-Vannevar Bush Faculty Fellow
-Founding Director of OpenStax

High Energy Laser Source Technology Maturation Achievements



https://taskandpurpose.com/news/army-laser-weapon-power/

The High Energy Laser Scaling Initiative (HELSI) aims to mature and demonstrate multiple high energy laser (HEL) source technologies of 300 kW and greater power levels. Over the past year, all technologies currently under development in HELSI have successfully met critical interim development goals, including two important milestone demonstrations by industrial developers where each achieved twice the power level reached by these technologies previously. These milestones are seen as essential steps along the critical path to full demonstration of 300-kW class technologies in the coming year, as well as realizing higher-power HEL weapons across the Department of Defense.

Joint Enhanced Munitions Technology Program (JEMTP) Detonator Explosive Formulation Journal Article selected for special edition Journal of DoD Research & Engineering (JDR&E)

On behalf of JEMTP, Dr. Eric Welle from the Air Force Research Laboratory (AFRL) reported on September 28 the publication of a journal article in a special edition of the Defense Technical Information Center's *Journal of DoD Research & Engineering* (JDR&E). This work was executed by a joint service (Air Force, Navy and Sandia National Lab) team funded by the R&E Platform & Weapon Technologies Office's JEMTP and AFRL. This JDR&E article presents work focused on the development of weapon detonator formulations that will be survivable in extreme environments, such as those experienced in penetrating or hypersonic systems. The formulations that emerge from this work will include the high output explosive that is simultaneously optimized for explosive and mechanical properties so they are reliable in future weapons subjected to extreme environments while being backwards compatible to legacy systems .

Military Ordinance and munitions testing
Photo Sourced from NTS

THE OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING FOR RESEARCH AND TECHNOLOGY

PROVIDING SCIENCE AND TECHNOLOGY LEADERSHIP THROUGHOUT DOD TO MEET THE CHALLENGES OF TODAY AND TOMORROW

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